

## **1.0 LIST OF STANDARDS ORGANIZATIONS BY EQUIPMENT CATEGORIES**

- 1.1 GENERAL
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- 1.3 VESSELS - TANKS
- 1.4 HEAT TRANSFER EQUIPMENT
- 1.5 ROTATING EQUIPMENT
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- 1.8 GENERAL SERVICES
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- 1.10 BUILDING SERVICES
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## **2.0 LIST OF MAJOR CODES AND STANDARDS RELATED TO PROCESS ENGINEERING**

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- 2.11 MSS
- 2.12 NACE
- 2.13 NEMA
- 2.14 NFPA
- 2.15 PFI
- 2.16 RMA
- 2.17 SSPC
- 2.18 TEMA
- 2.19 ULC
- 2.20 ISA
- 2.21 ISO
- 2.22 OFFSHORE PIPELINE
- 2.23 UNITS OF MEASUREMENT

## **1.0 LIST OF STANDARDS ORGANIZATIONS BY EQUIPMENT CATEGORIES**

### **1.1 General**

AGS American Gas Society  
ANSI American National Standards Institute  
BSI British Standards Institute  
CGSB Canadian General Standards Board  
CSA Canadian Standards Association  
ISO International Organization for Standardization  
NBS National Bureau of Standards  
ISA Instrument Society of America

### **1.2 Safety**

ANSI American National Standard Institute  
Dept. of Labour  
EPA Environment Protection Agency  
FM Factory Mutual  
NBFU National Board of Fire Underwriters  
NFPA National Fire Protection Association  
OSHA Occupational Safety and Health Administration  
UL Underwriters' Laboratories

### **1.3 Vessels - Tanks**

API American Petroleum Institute  
ASME American Society of Mechanical Engineers  
AWWA American Water Works Association  
NBBI National Bureau of Boiler & Pressure Vessel Inspectors  
ULC Underwriters' Laboratories of Canada

### **1.4 Heat Transfer Equipment**

API American Petroleum Institute  
CTI Cooling Tower Institute  
TEMA Tubular Exchanger Manufacturers Association

### **1.5 Rotating Equipment**

ANSI American National Standard Institute  
API American Petroleum Institute  
AWWA American Water Works Association  
DEMA Diesel Engine Manufacturers Association Hydraulics Institute  
MPTA Mechanical Power Transmission Association

### **1.6 Process Equipment**

AWWA American Water Works Association  
GPSA Gas Processor Suppliers Association  
API American Petroleum Institute  
ASME American Society of Mechanical Engineers

ASTM American Society for Testing and Materials  
ANSI American National Standards Institute  
NBBI National Bureau of Boiler and Pressure Vessel Inspectors  
CMAA Crane Equipment Manufacturers Association of America

### **1.7 Material Handling**

CEMA Conveyor Equipment Manufacturers Association  
CMAA Crane Equipment Manufacturers Association of America  
CSA Canadian Standards Association  
FEM Fédération Européenne de la Manutention (Rules for the Design of Hoisting Appliances)  
MHI Material Handling Institute  
RMA Rubber Manufacturers Association

### **1.8 General Services**

SAMA Scientific Apparatus Makers Association

### **1.9 Plant Services**

ACGIH American Conference of Governmental Industrial Hygienists  
AGA American Gas Association  
AWWA American Water Works Association  
CAGI Compressed Air and Gas Institute  
CGA Canadian Gas Association  
CGA INC. Compressed Gas Association

### **1.10 Building Services**

AMCA Air Moving and Conditioning Association  
ARI Air-Conditioning and Refrigeration Institute  
ASHRAE American Society of Heating, Refrigerating and Air-Conditioning Engineers

### **1.11 Plumbing**

ASPE American Society of Plumbing Engineers  
ASSE American Society of Sanitary Engineers  
- Canadian Plumbing Code  
PDI Plumbing and Drainage Institute  
- Provincial Plumbing Code

### **1.12 Piping**

API American Petroleum Institute  
ASME American Society of Mechanical Engineers  
MSS Manufacturers Standardization Society of the Valve and Fittings Industry  
PFI Pipe Fabricators Institute  
PPI Plastic Pipe Institute

### **1.13 Miscellaneous Material, Welding, etc.**

ASME American Society of Mechanical Engineers  
ASTM American Society for Testing and Materials

## **2.0 LIST OF MAJOR CODES AND STANDARDS RELATED TO PROCESS ENGINEERING**

### **2.1 ANSI**

#### A1 Liquefied Petroleum Gas System

A13.1 Scheme for Identification of Piping Systems

B.16.1 Cast Iron Pipe Flanges and Flanged Fittings, Class 25, 125, 250, and 800

B.16.5 Pipe Flanges and Fittings

B16.9 Steel Buttwelding Fittings

B31 Corrosion Control for B31.1

B31.1 Power Piping

B31.2 Fuel Gas Piping

B31.3 Chemical Plant and Petroleum Refinery Piping

B31.4 Liquid Petroleum Transportation Piping Systems

B31.5 Refrigeration Piping

B31.8 Gas Transmission and Distribution Systems (1982)

B31.11 Slurry Transportation Piping Systems

B36.10 Welded and Seamless Wrought Pipe

B36.19 Stainless Steel Pipe

B73.1M Horizontal, End Suction Centrifugal Pumps

B73.2M Vertical In-line Centrifugal Pumps

B133.2 Basic Gas Turbine

B133.4 Gas Turbine Control and Protection Systems

LOS4C1 Flushing and Cleaning Gas Turbine Gen. Lube Systems

58 Standard for the Storage and Hauling of Liquefied Petroleum Gas

MC96.1 Temperature Measurement Thermocouples

### **2.2 API**

Publ. 941 Steel for Hydrogen Service at Elevated Temperature and Pressures in Petroleum Refineries and Petrochemical Plants

Publ. 2009 Safe Welding and Cutting Practices in Refineries

Publ. 2015 Safe Entry and Cleaning of Petroleum Storage Tanks

Publ. 2021 Fighting Fires In and Around Flammable and Combustible Liquid Atmosphere Storage Tanks

Publ. 2030 Guidelines for Applications of Water Spray Systems for Fire Protection in the Petroleum Industry

Publ. 2517 Evaporation Loss from External Floating-Roof Tanks

Publ. 2557 Vapour Collection and Control Options for Storage and Transfer Operations in the Petroleum Industry

RP 14C Analysis, Design, Installation and Testing of Basic Surface Safety Systems on Offshore Platforms

RP 14F Design and Installation of Offshore Platforms

RP 14G Fire Prevention and Control on Open Type Offshore Production Platforms

RP 30 Calculation for Heater Tube Thickness in Petroleum Refineries

RP 500 Recommended Practice for Classification of Locations for Electrical Installations at Petroleum Facilities

RP 520 Sizing, Selection, and Installation of Pressure Delivery Devices in Refineries. Parts 1 and 2

RP 521 Guide for Pressure Delivery and Depressuring Systems  
 RP 526 Flanged Steel Safety Relief Valves  
 RP 551 Process Measurement Instrumentation  
 RP 560 Fired Heater for General Refinery Services  
 RP 651 Cathodic Protection of Aboveground Petroleum Storage Tanks  
 RP 652 Lining of Aboveground Storage Tank Bottoms  
 RP 682 Shaft Sealing System for Centrifugal and Rotary Pumps  
 RP 686 Recommended Practice for Machinery Installation and Installation Design (Alignment)  
 RP 1110 Pressure Testing of Liquid Petroleum Pipelines  
 RP 2001 Fire Protection in Refineries  
 RP 2003 Protection Against Ignitions Arising out of Static, Lighting and Stray Currents  
 Spec. 5L Line Pipe  
 Spec. 6D Pipeline Valves  
 Spec. 6FA Fire Test for Valves  
 Spec. 12D Field Welded Tanks for Storage of Production Liquids  
 Spec. 12F Shop Welded Tanks for Storage of Production Liquids  
 Spec. 12J Oil and Gas Separators  
 Spec. 12K Indirect Type Oil Field Heaters  
 Spec. 12L Specification for Vertical and Horizontal Emulsion Treeters  
 Spec. 12P Specification for Fiber glass Reinforced Plastic Tanks  
 Std. 510 Pressure Vessel Inspection Code  
 Std. 526 Flanged Steel Safety - Relief Valves  
 Std. 527 Seat Tightness of Pressure Relief Valves  
  
 Std.570 Piping Inspection Code  
 Std. 594 Wafer and Wafer-Lug Check Valves  
 Std. 598 Valve Inspection and Testing  
 Std. 599 Metal Plug Valves - Flanged and Butt-Welding Ends  
 Std. 600 Steel Gate Valves - Flanged and Butt-Welding Ends  
 Std. 602 Compact Steel Gate Valves - Flanged Threaded, Welding, and Extended-Body Ends  
 Std. 603 Class 150, Cast, Corrosion-Resistant, Flanged-End Gate Valves  
 Std. 607 Fire Test for Soft-Seated Quarter-Turn Valves  
 Std. 608 Metal Ball Valves - Flanged and Butt-Welding Ends  
 Std. 609 Lug - and Wafer - Type Butterfly Valves  
 Std. 610 Centrifugal Pumps For Petroleum, Heavy Duty Chemical and Gas Industry Services  
 Std. 611 General Purpose Steam Turbines for Refinery Services  
 Std. 612 Special Purpose Steam Turbines for Refinery Services  
 Std. 613 Special Purpose Gear Units for Refinery Services  
 Std. 614 Lubrication, Shaft-Sealing and Control Oil Systems for Special Purpose Application  
 Std. 615 Sound Control of Mechanical Equipment for Refinery Services  
 Std. 616 Gas Turbines for Refinery Services  
 Std. 617 Centrifugal Compressors for General Refinery Services  
 Std. 618 Reciprocating Compressors for General Refinery Services  
 Std. 619 Rotary-Type Positive Displacement Compressors for General Refinery Services  
 Std. 620 Design and Construction of Large, Welded, Low Pressure Storage Tanks  
 Std. 630 Tube and Header Dimensions for Fired Heaters for Refinery Service

Std. 650 Welded Steel Tanks for Oil Storage  
Std. 660 Heat Exchangers for General Refinery Service  
Std. 661 Air-Cooled Heat Exchangers for General Refinery Service  
Std. 670 Vibrations, Axial Position, and Bearing-Temperature Monitoring System  
Std. 671 Special Purpose Coupling for Refinery Service  
Std. 674 Positive Displacement Pumps - Reciprocating  
Std. 675 Positive Displacement Pumps - Controlled Volume  
Std. 676 Positive Displacement Pumps - Rotary  
Std. 677 General Purpose Gear Units for Refineries Services  
Std. 678 Accelerometer-Base Vibration Monitoring System  
Std. 1104 Welding Pipelines and Related Facilities  
Std. 2000 Venting Atmospheric and Low-Pressure Storage Tanks - Non-Refrigerated and Refrigerated  
Std. 2530 Measurement Standard Chapter 14, Natural Gas

## **2.3 ASME**

### **Boiler and Pressure Vessel Code**

#### **Section I Power Boilers**

#### **Section II Materials Specifications**

##### **Part A Ferrous Materials**

##### **Part B Non-Ferrous Materials**

##### **Part C Welding Rods, Electrodes and Filler Metal**

##### **Part D Properties**

#### **Section IV Heating Boilers**

#### **Section V Non-Destructive Examination**

**Section VIII Boiler and Pressure Vessels** (It gives detailed requirements for the design, fabrication, testing, inspection, and certification of both fired and unfired [pressure vessels](#). It specifically refers to those pressure vessels that operate at pressures, either internal or external, that exceed 15 psig.)

**Division 1** largely contains appendixes, some mandatory and some non-mandatory, that detail supplementary design criteria, nondestructive examination techniques, and inspection acceptance standards for pressure vessels. It also contains rules that apply to the use of the single ASME certification mark with the U, UM, and UV designators.

**Division 2** contains requirements for the materials, design, and [nondestructive examination](#) techniques for pressure vessels. Compared to Division 1, Division 2's standards are far more rigorous, but allow for higher stress intensity values. The rules put forth in Division 2 can also apply to human occupancy pressure vessels, primarily in the diving industry. Like Division 1, Division 2 contains guidelines that apply to the use of the single ASME certification mark as it applies to the U2 and UV designators.

**Division 3** provides rules that to pressure vessels that operate at pressures, either internal or external, exceeding 10,000 psi. Division 3 does not establish maximum pressure limits for either of the preceding Section VIII divisions, nor does it establish a minimum pressure limit for itself. Like the previous two divisions, it also provides rules that dictate the use of the single ASME certification mark with the U3 and UV3 designator.

#### **Section IX Welding and Brazing Qualifications**

## **Section X    Fibre glass-Reinforced Plastic Pressure Vessels**

### Standards

Std. 120    Gas Turbine Generator Lube Oil Systems

### Performance Test Codes

PTC 1    General Instructions  
PTC 2    Definitions and Values  
PTC 4.1    Steam Generating Units  
PTC 8.2    Centrifugal Pumps  
PTC 9    Displacement Compressors, Vacuum Pumps and Blowers  
PTC 10    Compressors and Exhausters  
PTC 22    Gas Turbine Power Plants

### 2.4    ASHRAE

#### ASHRAE Handbooks

### 2.5    AWWA

C110    Gray-Iron and Ductile Iron Fittings, 3 in. through 48 in. for Water and Other Liquids  
C151    Ductile Iron Pipe, Centrifugally Cast in Metal Molds or Sand-Lined Molds for Water and Other Liquids  
E101-88    Vertical Turbine Pumps - Live Shaft and Submersible Types  
C502    Dry Barrel Hydrants Fire Hydrants

### 2.6    CEMA

#### Belt Conveyors for Bulk Materials Handbook

### 2.7    CGSB

41-GP-22    Standard for Process Equipment Reinforced Polyester, Chemical Resistance, Custom-Contact Molded

### 2.8    CSA

B-51    Boilers and Pressure Vessels  
B-53    Identification of Piping Systems  
B-52-M    Mechanical Refrigeration Code  
B-63    Welded and Seamless Steel Pipe  
B-137.3    Rigid Poly (Vinyl Chloride) (PVC) Pipe  
B-137.4-M    Polyethylene Piping Systems for Gas Service  
W-48.1    Mild Steel Covered Arc-Welding Electrodes  
W-48.3    Low-Alloy Steel Arc-Welding Electrodes  
Z-183    Oil Pipeline Transportation Systems

Z-184-M Gas Pipeline Systems  
Z-245.1 Pipeline Systems and Materials  
Z-245.10 Wrought Steel Buttwelding Fittings and Flanges  
Z-276-M LNG - Production, Storage and Handling

## 2.9 CTI

STD-103 Standard Specifications for the Design of Cooling Tower Structures with Redwood Lumber  
STD-111 Gear Speed Reducers  
STD-114 Standard Specifications for the Design of Cooling Tower Structures with Douglas Fir Lumber  
NCL-109 Nomenclature for Industrial Water - Cooling Towers  
WMS-112 Pressure Preservative Treatment of Lumber for Industrial Water - Cooling Towers  
ATC-105 Acceptable Test Code for Water-Cooling Towers

## 2.10 Hydraulics Institute

Standards for Centrifugal, Vertical, Rotary and Reciprocating Pumps

## 2.11 MSS

### Standard Practices

SP-6 Standard Finishes for Contact Faces Pipe Flanges and Connecting End Flanges of Valves and Fittings  
SP-25 Standard Marking System for Valves, Fittings, Flanges and Union  
SP-44 Steel Pipeline Flanges  
SP-53 Quality Standards for Steel Castings and Forgings for Valves, Flanges and Fittings and Other Piping Components - Mag. Particle  
SP-54 Quality Standards for Steel Castings and for Valves, Flanges and Fittings and Other Piping Components - Radiographic  
SP-55 Quality Standards for Steel Castings and for Valves, Flanges and Fittings and Other Piping Components - Visual  
SP-58 Pipe Hangers and Supports - Material, Design and Manufacture  
SP-61 Pressure Testing of Steel Valves  
SP-69 Pipe Hangers and Supports - Selection and Application  
SP-75 High Test Wrought Butt Welding Fittings  
SP-82 Valve Pressure Testing Methods  
SP-89 Pipe Hangers and Supports - Fabrication and Installation Practices

## 2.12 NACE

MR-01-90 Sulfide Stress Cracking Resistant Metallic Material for Oil Field Equipment  
RP-01-78 Design, Fabrication and Surface Finish of Metal Tanks and Vessels to be Lined for Chemical Immersion Service  
RP-0188-88 Discontinuity (Holiday) Testing of Protective Coatings



## 2.13 NEMA

SM23-1979 Steam Turbines for Mechanical Drive Service

## 2.14 NFPA

- 11 Low Expansion Foam Systems
- 11A Medium and High Expansion Foam Systems
- 12 Carbon Dioxide Extinguishing Systems
- 12A Halon 1301 Fire Extinguishing Systems
- 12B Halon 1211 Fire Extinguishing Systems
- 13 Installation of Sprinkler Systems
- 14 Stand Pipe and Hose Systems
- 15 Water Spray Fixed Systems
- 16 Deluge Foam-Water Sprinkler and Spray Systems
- 17 Dry Chemical Extinguishing Systems
- 20 Centrifugal Fire Pumps
- 22 Water Tanks for Private Fire Protection
- 24 Installation of Private Fire Service Mains and Their Appurtenances
- 25 Water Based Fire Protection Systems
- 37 Stationary Combustion Engines and Gas Turbines
- 51 Oxygen-Fuel Gas Systems for Welding
- 54 National Fuel Gas Code
- CUA 58 LP Gas Storage, Use
- 59 LP Gases at Utility Gas Plants
- 59A Storage and Handling of Liquefied Natural Gas
- 82 Incinerators, Waste and Linen Handling Systems and Equipment
- 214 Water Cooling Towers
- 291 Fire Flow Testing and Marking of Hydrants
- 655 Prevention of Sulphur Fires and Explosions

## 2.15 PFI

- ES 4 Hydrostatic Testing of Fabricated Piping
- ES 5 Cleaning of Fabricated Piping
- ES 7 Minimum Length and Spacing for Welded Nozzles
- ES 18 Ultrasonic Examination of Tubular Products
- ES 22 Recommended Practice for Color Coding of Piping Materials

## 2.16 RMA

Conveyor and Elevator Belt Handbook

## 2.17 SSPC

PA1 Shop, Field and Maintenance Painting

SP1 Solvent Cleaning  
SP5 White Metal Blast Cleaning  
SP6 Commercial Blast Cleaning  
SP7 Brush-Off Blast Cleaning  
SP8 Pickling  
SP10 Near-White Blast Cleaning

Guide to Vis1 Guide to Pictorial Surface Preparation Standards for Painting Steel

2.18 TEMA

TEMA Standard

2.19 ULC

S603M Standard for Shop Fabricated Steel Underground Tanks for Flammable and Combustible Liquids

S630M Standard for Shop Fabricated Steel Aboveground Tanks for Flammable and Combustible Liquids

2.20 ISA

85.1 Instrument Symbols and Identification

2.21 ISO

5167 Sizing of Metering Orifice

2.22 Offshore Pipeline

DNV Rules for Submarine Pipeline Systems

2.23 Units of Measurement

ISO 1000 SI Units